

SPRING-LOADED COMPRESSION CABLE GRAB

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TECHNICAL FIELD

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The invention generally pertains to cable grabs, which are also designated as cable grips, and more specifically to a cable grab utilizing a spring-loaded collet that is inserted into a chuck having a bifurcated bracket. The cable grab permits a wire rope cable to penetrate through the grab, gripping the cable by spring tension on the collet which permits manual tightening of the cable line without disconnection.

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BACKGROUND ART

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Previously, many types of cable grips or grabs have been used in endeavoring to provide an effective means for tightening a wire rope cable to a fixed position and allowing removal or loosening of the cable. This use is particularly adaptable for horizontal lifeline applications.

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The prior art listed below did not disclose any patents that possess the novelty of the instant invention, however the following U.S. patents are considered related:

30	<u>Patent Number</u>	<u>Inventor</u>	<u>Issue Date</u>
	4,114,242	Luthi	Sep. 19, 1978
	5,677,975	Burek et al.	Oct. 13, 1997

5,924,522	Ostrobrod	Jul. 20, 1999
6,446,936	Ostrobrod	Sep. 10, 2002
6,581,725	Choate	Jun. 24, 2003

5 Patent No. 4,114,242 issued to Luthi discloses a cable grip or gripping apparatus that uses tapered segmented grips to de-tension a tensioned member. The apparatus consists of a body with slotted gripping means having similar tensioning members gripping a cable. The gripping means are in coaxial configuration with the tensioning members.

10 Patent No. 5,677,975 issued to Burek et al. discloses a grip block assembly having a hollow frame with wall openings that allow an elongated member to pass therethrough. Lever arms pivot on the same axis as a cable functions in a scissoring manner to grip the cable surface. An actuator block has depending members which contact the lever arms, thus causing them to pivot with respect to each other.

15 Patent No. 5,924,522 issued to Ostrobrod discloses a cable grab which has a frame assembly with a U-shaped bracket and a pair of spaced-apart side plates which fit around the cable. A secondary frame fits within the U-shaped bracket and carries a brake in the form of a pulley mounted in an elongated slot that locks in the event of a fall.

20 Patent No. 6,446,936 issued to Ostrobrod discloses a lifeline safety apparatus consisting of housing secured to an anchor point. The free end of the lifeline is connected to a cable passing around a drum, and an adjustable lever winds the drum. When tension on the lifeline reaches a desired level a brake slips and the lever rotates freely.

25 Patent No. 6,581,725 issued to Choate discloses a method for creating a horizontal lifeline between two anchorages. A section of the lifeline has a modulus of elasticity, thereby providing shock absorbing capabilities and is tuned to equal the deployment load.

DISCLOSURE OF THE INVENTION

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The primary object of the invention is to permit an apparatus to feed the distal end of a wire rope cable through a grab freely and yet grip the cable tightly when pulled in an opposite direction. This object is accomplished easily by the use of a spring-loaded collet within a chuck. When the cable is threaded into the invention, the collet is pushed away
10 from a tapered portion of the chuck, thus allowing the jaws of the collet to separate and permit the cable to pass through. This permits the cable to be manually pulled tight when it is attached to a fixed object on one end, and the apparatus is attached to a second fixed position on the other, which takes up all of the slack and tightens the cable in between. This function is particularly effective when used in conjunction with a horizontal lifeline,
15 which is commonly used in the construction trade. The lifeline is moved frequently and final tensioning is accomplished by tightening a turnbuckle, therefore a fixed length of the cable is impractical as the overall length of the lifeline is not always the same. The invention fills the need for quick and easy removal and installation of a lifeline in a host of different locations, as the cable is manually tightened, thus permitting final tensioning
20 by a turnbuckle, which has a limited displacement.

While the cable grab is used primarily for horizontal lifelines, an important object of the invention is it may be used in a myriad of other applications where a wire rope cable is utilized.

Another object of the invention is that the cable grab holds a wire rope tightly
25 when tensioned between two points, the more force that is exerted on the cable, the tighter the grip is on the collet as it is drawn into a tapered socket on the chuck.

Still another object of the invention is that the cable grab may be released easily by rotating the hollow bolt on one end with a common wrench, which spreads the jaws of the collet.

These and other objects and advantages of the present invention will become apparent from the subsequent detailed description of the preferred embodiment and the appended claims taken in conjunction with the accompanying drawings.

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BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is an isometric view of the spring-loaded compression cable grab.

FIGURE 2 is a side view of the cable grab.

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FIGURE 3 is a top view of the cable grab.

FIGURE 4 is a front view of the cable grab.

FIGURE 5 is a rear view of the cable grab.

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FIGURE 6 is an isometric view of the cable grab having a cable inserted into the cable grab and a set of arms attached to a turnbuckle illustrating the utility of the invention.

FIGURE 7 is a partial isometric view of a hollow cylindrical chuck used in the cable grab shown removed from the invention for clarity.

FIGURE 8 is a cross-sectional view taken along lines 8-8 of FIGURE 7.

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FIGURE 9 is a partial isometric view of a hollow bolt used in the cable grab shown removed from the cable grab for clarity.

FIGURE 10 is a cross-sectional view taken along lines 10-10 of FIGURE 9.

FIGURE 11 is a partial isometric view of a collet used in the cable grab shown removed from the cable grab for clarity.

FIGURE 12 is a cross-sectional view taken along lines 12-12 of FIGURE 11.

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FIGURE 13 is a partial isometric view of a hollow chuck cap used in the cable grab shown removed from the cable grab for clarity.

FIGURE 14 is a cross-sectional view taken along lines 14-14 of FIGURE 13.

FIGURE 15 is a partial isometric view of a first arm used in the cable grab shown removed from the cable grab for clarity.

FIGURE 16 is a partial isometric view of a second arm used in the cable grab shown removed from the cable grab for clarity.

FIGURE 17 is a cross-sectional view taken along lines 17-17 of FIGURE 15.

FIGURE 18 is a cross-sectional view taken along lines 18-18 of FIGURE 16.

5 FIGURE 19 is a partial isometric view of an o-ring used in the collet of the cable grab shown removed from the cable grab for clarity.

FIGURE 20 is a cross-sectional view taken along lines 20-20 of FIGURE 19.

FIGURE 21 is a partial isometric view of a compression spring used in the cable grab shown removed from the cable grab for clarity.

10 FIGURE 22 is a cross-sectional view taken along lines 22-22 of FIGURE 21.

FIGURE 23 is an exploded view of the cable grab.

FIGURE 24 is a view showing the cable grab used in combination with a horizontal lifeline.

15 FIGURE 25 is an elevational view of the cable grab as applied to a lifeline in conjunction with a fall-protection restraint apparatus employing a pair of opposed poles.

BEST MODE FOR CARRYING OUT THE INVENTION

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The best mode for carrying out the invention is presented in terms of a preferred embodiment. The preferred embodiment, as shown in FIGURES 1 through 25, is comprised of a spring-loaded compression cable grab 20 for attaching a wire rope cable 22, such as these utilized in a horizontal lifeline or the like, to a fixed object 24

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The cable grab 20 consists of a hollow cylindrical chuck 26, having with a first end 28 and a second end 30, with a tapered socket 32 formed within the hollow between the first and second ends. The hollow cylindrical chuck 26 includes internal threads 34 on the first end 28, and internal threads 34a on the second end 30, for receiving threaded elements. The hollow cylindrical chuck is in a cylindrical configuration, as shown in

FIGURES 1-8, and has an enlarged circular portion 36 on the first end 28 which includes a pair of opposed flats 38.

A pair of bifurcated arms 40 are attached onto the chuck 26 for substantial attachment of the cable grab 20 to a fixed object 24. The pair of bifurcated arms 40 are
5 attached onto the flats 38 of the enlarged portion 36 of the hollow cylindrical chuck 26, preferably with a weld joint 42, as shown in FIGURES 1-6. The bifurcated arms 40 have a shape that is offset to contiguously engage each of the arms 40 on an end opposite the weld joint 42. Where the pair of bifurcated arms 40 unitedly join together, a clearance hole 44 is provided that penetrates completely through both arms 40 and is used for the
10 attachment of the cable grab 20 to the fixed object 24.

A collet 46 is slideably disposed within the tapered socket 32 of the hollow chuck 26, with the collet including a centrally-positioned bore 48 therethrough having an inner diameter that is compatible with the wire rope cable 22. It should be noted that for a horizontal lifeline, a 3/8 inch (0.98cm) diameter is relatively standard in the industry,
15 however any applicable size cable may be substituted with ease as the invention is not limited to a particular size cable or application as the cable grab 20 has utility for many and varied purposes. The collet 46 is made with a plurality of tapered segments 50 that are retained with an O-ring 52 on the collet's largest end for gripping the cable 22 contained by the bore 48 formed within the segments 50. The collet 46 is illustrated in
20 FIGURES 11, 12 and 23, with the collet tapered segments 50 preferably made in three discrete segmented elements, however more elements may be used for larger diameter cables.

A hollow chuck cap 54 is attached to the second end 30 of the chuck 26, as illustrated in FIGURES 1-3, 5, 6 and 23. The hollow chuck cap 54 includes a set of
25 external threads 56 for attachment to the internal threads 34a that are cut into the second end 30 of the chuck 26, as shown in FIGURES 13 and 14. The chuck cap 54 has a knurled surface 58 machined on an end opposite the external threads 56, as illustrated in FIGURES 13 and 23.

A compression spring 60, as shown in FIGURES 21-23, is disposed within the hollow of the chuck 26 between the collet 46 and the chuck cap 54, urging the collet 46 into the tapered socket 32. The collet therefore firmly grips the wire rope cable 22 after the cable 22 has been inserted into the bore 48, in the collet 46 while permitting the cable 22 to enter from the first end 28 of the chuck 26. The compression spring 60 is of industry standard construction and is formed of a material such as stainless steel or spring steel.

A hollow bolt 62 is threadably attached to the internal threads 34 of the chuck 26 on the first end 28 and is used for removal of the cable grip 20 from the cable 22. When the hollow bolt 62 is rotated inward against the collet 46, the collet 46 is forced away from the tapered socket 32 in the chuck 26, thereby releasing the grip on the cable 22. The hollow bolt 62 preferably has a hex head 64 on one end and a plurality of external threads 56a on the other, with the threads 56a compatible with the internal threads 34 on the first end 28 of the cylindrical chuck 26.

The spring-loaded compression cable grab 20 is preferably manufactured using all-steel construction, however other materials, such as aluminum is considered to be an acceptable substitute.

While the invention may be used for many other purposes, an exemplary utility is illustrated in FIGURES 24 and 25, wherein the cable grab 20 is used in conjunction with a horizontal lifeline. FIGURE 23 depicts a lifeline 66 connected between two stationary fixed objects 24, with a jaw and jaw turnbuckle 68 on one end of the lifeline 66 and the spring-loaded compression cable grab 20 attached to an inboard jaw on the turnbuckle 68. The cable 22 extends through the grab 20 through the first end 28 of the chuck 26, with the distal end of the cable 22 attached to a shock absorber 70 in a conventional manner, which is likewise connected to the fixed object 24. In operation, the turnbuckle 68 and cable grab 20 remain connected together, and the turnbuckle 68 is attached to one of the fixed objects 24. The cable 22 and shock absorber 70 also remain attached, and the shock absorber 70 is connected to the remaining fixed object 24, as shown in FIGURE 25. The cable 22, which has already been manually inserted into the hollow bolt 62, protrudes from the chuck cap 54, as illustrated in FIGURE 6, and is pulled taut through the space

between the arms 40 until the cable 22 is stretched as much as possible by hand. The final tightening is accomplished by rotating the turnbuckle jaws 68.

FIGURE 25 illustrates the invention used in the lifeline application in a multi-story building, where the lifeline is stretched between two columns 72 such as taught in
5 the inventor's previous U.S. Patent Application No.10/256,473.

While the invention has been described in complete detail and pictorially shown in the accompany drawings, it is not to be limited to such details, since many changes and modifications may be made to the invention without departing from the spirit and scope thereof. Hence, it is described to cover any and all modifications and forms which may
10 come within the language and scope of the appended claims.